

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference SH-47597	FOR FURTHER ACTION	
See Form PCT/IPEA/416		
International application No. PCT/GB2004/001897	International filing date (day/month/year) 04.05.2004	Priority date (day/month/year) 02.05.2003
International Patent Classification (IPC) or national classification and IPC H01F38/14, H02M5/00, H01R3/00, H01R13/66, H02M7/00		
Applicant LIMPKIN, George Alan et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. *(sent to the applicant and to the International Bureau)* a total of 14 sheets, as follows:
 - sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)), containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:
<input checked="" type="checkbox"/> Box No. I Basis of the opinion <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application

Date of submission of the demand 01.03.2005	Date of completion of this report 10.05.2005
Name and mailing address of the International preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Reder, M Telephone No. +49 89 2399-7762



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Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
 - international search (under Rules 12.3 and 23.1(b))
 - publication of the international application (under Rule 12.4)
 - international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1, 2, 5-11, 13, 14, 19-22	as originally filed
3, 4, 12, 15, 16, 17, 18	received on 12.04.2005 with letter of 11.04.2005

Claims, Numbers

1-30	received on 12.04.2005 with letter of 11.04.2005
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Drawings, Sheets

1/16-8/16, 10/16-16/16	as originally filed
9/16	received on 12.04.2005 with letter of 11.04.2005

- a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. The amendments have resulted in the cancellation of:

- the description, pages
- the claims, Nos.
- the drawings, sheets/figs
- the sequence listing (*specify*):
- any table(s) related to sequence listing (*specify*):

4. This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- the description, pages
- the claims, Nos.
- the drawings, sheets/figs
- the sequence listing (*specify*):
- any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-25
	No: Claims	26-29
Inventive step (IS)	Yes: Claims	1-25
	No: Claims	26-30
Industrial applicability (IA)	Yes: Claims	1-30
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

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Re Item V.

1. The following documents are referred to in this communication:

D1 : EP 1 063 468 A
D2 : WO 02/35578 A
D3 : EP 1 130 752 A
D4 : EP 0 982 832 A
D5 : DE 43 44 071 A
D6 : GB 1 366 134 A
D7 : US 4 303 902 A
D8 : US 2002/008973 A
D9 : US 2002/008973 A1
D10: DAVID R. LIDE: "CRC Handbook of Chemistry and Physics, 79th Edition"
1998, CRC PRESS , BOCA RATON , XP002295048,
ISBN: 0-8493-0479-2
D11: GB 1 517 695 A

The document D11 was not cited in the international search report. A copy of the document is appended hereto.

D9 and D10 are relevant only for the assessment of inventive step of original dependent claims 8 and 13 depending on original claim 1.

2. ARTICLE 34(2)(b) PCT

2.1 Present claim 1 is a reformulation of original claim 1 with the following differences with respect to the original formulation (now filed as claim 26):

- a) The high frequency power supply is not anymore regarded as part of the apparatus.
- b) At least one of primary and secondary core portions has a preformed profile to accept a user wound winding, the preformed profile ensuring a correct number of windings are applied.

2.2 These differences are considered as corresponding to Article 34(2)(b) PCT for the following reasons:

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a) Even if the power supply is not anymore regarded as part of the apparatus, the use with a high frequency power supply is defined in new claim 1. Further, the apparatus not including the power supply is disclosed in original claim 22.

b) A preformed profile to ensure that the correct number of windings are applied is disclosed in original claim 35. Even if this claim does not explicitly specify that the profile is formed on the first or secondary cores made of high resistivity material, figures 14b, 14d and 15 and the respective passages of the description are considered to support this feature sufficiently.

3. INDEPENDENT CLAIM 1

3.1 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows a two-part induction coupling apparatus (D1: 8) for supplying energy to a load, in use the two-part induction coupling comprising:

- a first core portion (D1: 12a) and a primary winding (D1: 11a),
- the primary winding being connected to a high frequency power supply (D1: 14a),
- a second part comprising a second core portion (D1: 12b) and a secondary winding (D1: 11b), the secondary winding being connected for delivering energy to a load,
- the core portions being of a high resistivity material (D1, col. 7, l. 1: "pot cylindrique 12a ou 12b en ferrite").

3.2 Other apparatuses with the same features as the subject-matter of present claim 1 are disclosed in documents D2 to D8.

3.3 The subject-matter of claim 1 differs from this known two-part induction coupling apparatus in that at least one of primary and secondary core portions has a preformed profile to accept a user wound winding, the preformed profile ensuring a correct number of windings are applied.

3.4 The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

3.5 The problem to be solved by the present invention may be regarded as modifying an apparatus as known from D1 such that during installation the cutting of wires can be minimized.

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3.6 The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

- None of D1 to D8 explicitly discloses an inductive coupler with user wound windings. It is assumed that these couplers have factory wound windings. Further, there is no hint for advantages that could be achieved by user wound windings.
- Preformed profiles of the cores are neither disclosed in D1 to D8 nor does the necessity for such profiles arise from the disclosure of these documents.
- Document D11 discloses an insulating coil former with a helical groove for accommodating a predetermined length of a coil conductor and thereby constituting a coil with a precisely determined inductance. However, the groove is not formed in the core portion as the coil has no core, and there is no hint that the coil is intended to be wound by the user. Further, the coil is used in a completely different context. Therefore, it is not considered obvious for a skilled person to use a preformed helical profile as known from D11 as outer shape of the first and/or second core of a two-part induction coupling apparatus as known from D1.

4. INDEPENDENT CLAIMS 2-25

Claims 2-25 are dependent on claim 1 and as such also meets the requirements of the PCT with respect to novelty and inventive step.

5. INDEPENDENT CLAIM 26

5.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 26 is not new in the sense of Article 33(2) PCT.

5.2 Document D1 discloses an apparatus for supplying energy to a load comprising:

- a power supply unit having an input (D1: 4) for receiving current at mains frequency,
- means (D1: 14a) for increasing the frequency to a higher frequency,
- an output (D1: 36, 37) for delivering energy at a higher frequency,
- a two part induction connector (D1: 8) having a first core portion (D1: 12a) that has a primary winding connection (D1: 11a) connected to the output of the power supply unit and a second core portion (D1: 12b) that has a secondary winding connection (D1: 11b) for

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delivering energy to a load (D1: 7),
-the core portions being of a high resistivity material (D1, col. 7, l. 1: "pot cylindrique 12a ou 12b en ferrite").

5.3 Other apparatuses with the same features as the subject-matter of present claim 26 are disclosed in documents D2 to D8.

Even if the power supply with means for increasing the frequency is not explicitly mentioned in D6 and D7, such a frequency converter is obviously necessary for the disclosed use of the connectors of D6 and D7 at frequencies higher than mains frequency.

5.4 As a consequence, present claim 26 is not new in the sense of Article 33(2) PCT.

6. INDEPENDENT CLAIM 28

6.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 28 is not new in the sense of Article 33(2) PCT.

6.2 Document D1 discloses a lamp (D1: 7):

-having formed in its housing a secondary core (D1: 12b) of a two-part induction connector (D1: 8) and being in electrical connection with a winding (D1: 11b) on said core in order to energise the lamp.

6.3 Other lamps with the same features as the subject-matter of present claim 28 are disclosed in documents D2 and D8.

6.4 As a consequence, present claim 28 is not new in the sense of Article 33(2) PCT.

7. DEPENDENT CLAIMS 27, 29, 30

7.1 Dependent claims 27, 29 and 30 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).

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7.2 The additional features of the following claims are already disclosed in one or more of documents D1 to D8:

- two-part induction connector, or primary or secondary portion thereof for use in the apparatus of claim 26 (claim 27) in D1 to D8 (see 6. above),
- use of the apparatus for supplying energy to a load in the fields of e.g. telecommunication devices, sub-marine devices or lighting (claim 29) in D1 to D8.

7.3 As a consequence, present claims 27 and 29 are not new in the sense of Article 33(2) PCT.

7.4 The additional feature of claim 30 is not considered as involving an inventive step for the following reasons:

- The use of an apparatus for supplying energy to a load with renewable electricity generators is an obvious possibility.

7.5 As a consequence, present claim 30 is not considered as involving an inventive step in the sense of Article 33(3) PCT.

also generally similar but discloses the use of ferrite cores and transmission frequencies of e.g. 100 kHz. The inductive couplers that it describes are intended for use where the ambient medium dictates against normal exposed metal-to-metal contact, e.g. for avoiding sparks in explosive atmospheres, for use in the off-shore industry, or for underwater applications, see also GB-A-2020116 which concerns a coupler for underwater use and US-A-4538863 which discloses couplers for underwater electrical supply or power lines.

Summary of the Invention

The invention is based on the realization that with modern electronic high frequency energy supplies it has become feasible to use a two-part induction coupling to provide energy transmission to a load, provided that the core material of the coupling device is resistive to avoid eddy currents and low hysteresis and is low loss to avoid overheating at the frequencies used, and that over-current problems under no-load conditions are not so severe at the higher frequencies used where the primary winding on the first half-core provides a reactance, and where the energy supply has built-in over-current and/or load short circuit protection. In particular, the combination of a high frequency energy supply, with a two-part coupling having a core of a low reluctance material is believed to be new. Frequencies which are envisaged are above 23 kHz extending to a frequency of typically 10 MHz. Preferably the range currently envisaged is between 25-100 kHz, more preferably between 25-60 kHz. Use of so-called quasi-mode power supplies permits high efficiency frequency conversion from a relatively low to a high frequency.

The invention provides a two-part apparatus for supplying energy to a load, in use the two-part induction coupling including a first part comprising a first core portion and a primary winding, the primary winding being connected to a high frequency power supply and a second part comprising a second core portion and a secondary winding, the secondary winding being connected for delivering energy to a load, the core portions being of a high resistivity material, in which at least one of the first and second core portions has a preformed profile to accept a user wound winding, the preformed profile ensuring a correct number of windings are applied.

A power supply unit having an input for receiving current at mains frequency with means for increasing said frequency to a higher frequency may be provided for delivering energy at the higher frequency.

Where "mains supply" relates to the standard local distributed electrical supply, 5 typically 50 - 60Hz, although this may be higher or lower.

The aforesaid two-part connector ideally is provided with interengageable formations for establishing a mechanical, as well as an inductive, connection between the two parts and preferably for holding said parts in relative attitudes such that pole pieces of said primary and secondary portions coincide in order to promote efficient 10 inductive coupling.

Preferably the primary and secondary portions of the connector are retained together by clips or other resilient means with a minimal air gap or with a thin separating membrane of plastics or other electrically insulating material. The portions of the two part inductive connector may comprise pins and sockets that removably push 15 together for mating the parts of the connector.

Alternatively the portions of the connector may comprise clips and recesses that removably snap together for mating first and second parts thereof. In a further alternative, they may comprise bayonet formations and recesses that removably twist together for mating the parts of the connector.

20 As previously explained, various forms of mechanical connection are envisaged to hold the two parts of the coupling positively together.

It will be appreciated that all the circuits described above are contained in the unit 202, which is believed to be representative of devices on the market based on discrete components and bipolar transistors.

Switching mode power supplies are extensively described in the patent literature, 5 and the technology described in such references may be applied to the invention. A circuit that can provide a constant voltage or a constant current output is disclosed in US-A3538418 (Allington, Instrument Specialities Company) and further designs for switched mode power supplies are described in e.g. US-A-4453205 (Voight) and US- 10 A-4945465 (Marinus, Philips). Over-current control and/or overload protection are discussed in e.g. US-A-4713740 (Drabing, SMS Advanced Power), US-A-4916569 (Konopka, Zenith Electronics), US-A-4858094 (Barlage, Allied-Signal), US-A- 15 5633787 (Song, Samsung), US-A-6434023 (Preller, Infineon Technologies), US-A- 2001/0009517 (Preller), US-A-2001/0019469 (Koh, Thomson Multimedia), and US- A200210105767 (Schuellein, Semiconductor Components). The latter specification reviews over-current protection schemes in detail including: 20

(a) pulse-by-pulse schemes that clamp the peak of the power supply output current when a sensed current magnitude exceeds a threshold current magnitude, and inhibits the power supply output by reducing the duty cycle of a power switching device;

(b) A hiccup current limit scheme which terminates power supply operation once an over-current condition is detected and attempts restart after a predetermined time period;

(c) a foldback current limit scheme which causes the power supply maximum current limit to decrease with power supply output voltage so that if the supply output voltage 25 decreases due to an overload or short circuit, the maximum current limit also decreases so that the output current is reduced to a safe level; and

cores. Switched mode power supplies for fluorescent lamps are disclosed, for example, in US-A-5065074 (Hesketh, Coolite), US-A-5359274 (Bandel, Philips), US-A5796597 (Fitzgerald, Thomson), US-A-6100647 (Giannopoulos, Philips).

Figure 4 is a detail of the split transformer with a supply side or socket winding 104 having turns MT and an output or plug side winding having turns NT. For step up Vout, $NT/MT > 1$ whereas for step down Vout, $NT/MT < 1$. Thus in the example of Figure 5, components 500-512 correspond to those previously described, MT is for example four turns, NT is four turns also to deliver an output RMS of 12 V to low voltage lamp 514 and NT is 8 turns to deliver 24V to the lamp. In the example of Figure 6a, components 600-612 correspond to those previously described, MT is for example 91 turns, NT is also 91 turns to deliver an output RMS to a lamp circuit. One side of secondary winding 610 is connected to ballast inductance 614 in series with one electrode of fluorescent lamp 616 and is series connected via series capacitors 617, 618 and bridging variable resistor 620 (620: R_v = positive temperature coefficient PTC) to the other electrode of the lamp 616 which in turn is connected to the other side of secondary winding 610.

A more detailed circuit is shown in Figure 6b, which is similar to Figure 2d except that electrolytic capacitor C11 is connected between one side of the rectifier and the negative rail, the output transformer T2 is deleted and the primary of the two-part transformer is connected across the half bridge in series with feedback coil T1c.

In the further example of Figure 7a, components 700-712 correspond to those previously described, and winding 710 is connected across HF diodes D1-D4, connected as a bridge rectifier 714 that supplies DC energy via series resistor 716 and optional HF capacitor 720 to light emitting diode (LED) 718. The output of the supply unit 702 may be a HF modulated DC, as at Figure 7b, or as HF DC as at Figure 7c.

Wire loop systems are shown in Figures 8 and 9. In Figure 8 the parts 800-814 are as previously described and the primary winding 804 is at an arbitrary location on a single wire loop 803. Transmission of energy from supply 802 to load 814 can be established without cutting any wires or piercing the insulation layer at the winding 804 and therefore can be repositioned without any damage to cables thereof.

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In Figure 9 the wire loop 903 and the socket-half 904, 906 of the present connector form part of lighting wiring built into a building. Plug parts 910 and 912 form part of a light fitting 916 built into a ceiling of the building and the light fitting has a conventional socket 918 for a conventional low voltage incandescent lamp 920 which 10 provides the load 914 generally indicated in this instance by an arrow. The required connection can be established without using terminal blocks or cut wires, which reduces the skill required to fix the fitting 916 in position.

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In Figure 10, a mains supply 1000 feeds high frequency power supply unit 1002 which outputs into a first two-part connector 1004a, 1010a connected by cable 1007 to second two-part connector 1004b, 1010b which in turn is connected to load 1014, thereby providing an indirect connection between the power supply 1002 and the load 1014.

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Various possibilities for providing lighting units with the two-part inductive connectors described above are shown in Figures 11-13. In Figure 11, mains supplies 1100a - 1100d provide energy to individual power supply units 1102a - 1102d connected by respective two-part connectors 1106a - 1106d, 1112a -1112d to loads 1114a -1114d in the form of lighting units. Installation of the system requires no cut wires and simply relies on loops of wire through the ceiling. No terminal blocks need be used, and the individual lighting units are easy to install and replace. In Figure 12, a mains supply 1200 feeds supply unit 1202 having a ring providing energy to series 25 arranged connectors 1204a-1204c, 1210a-1210c connected to respective loads 1214a-1214c

(1< c < n). The arrangement of Figure 13 is similar except that the connectors 1304a-1304n, 1310a-1310n are connected to the unit 1302 in parallel.

The present invention can provide electrical wiring for a building in which, for example in a lighting circuit the overall number of screw-in or push-in terminations can be reduced. Most electrical fires start in cables or terminations owing to breaks and arcing. The greater the number of terminations, the greater the risk of fire or electric shock. Furthermore, making terminations is the most time-consuming and hence costly part of any electrical installation, requiring skilled labour. The fewer the number of terminations, the fewer the mistakes that can be made. Lighting installations are particularly difficult and time consuming because the outlet has to be installed in a ceiling at height, upside-down and against gravity. Several connections are required: a live earth neutral, a switched live and often a permanent live. Low voltage installations require transformers and greater current and risk of arcing. In addition to electrical connections, mechanical fixings are required and the weight of the luminaire has to be supported while connections are being made.

Use of a two-part induction connector to provide power connections to a LED-based lighting installation is shown in Figures 14a-14e. A lamp holder body 1401 of polycarbonate or other electrically insulating plastics material is provided with a top opening for receiving a ferrite half-core 1403 carrying a primary winding 1404, and has fixing flanges and depending clips 1407. A lamp holder 1409 has a die-cast aluminium reflector 1411 attached to a polycarbonate rear housing 1413 in which is fixed a complementary second ferrite half-core 1415. Upwardly facing latch tongue 1417 can be demountably engaged into the clips 1407 to fasten the lamp holder in position. The lamp holder 1409 also supports a LED lamp such as a Luxeon (Trade Mark) LED which can receive energy via secondary winding 1420 with the addition of a rectifying bridge and associated components see Figure 7a on half-core 1415. The snap engagement of tongue 1417 between clips 1407 and resilience of the materials used enables the half-cores 1403, 1415 to be urged positively into face-to-face contact,

minimising the air gaps between them and consequential energy losses. An OEM manufactured housing 1422 is designed to be recessed into a ceiling and has a top face 1424 formed with an aperture 1426 through which the extremities of primary halfcore 1403 depend and into which tongue 1417 of the lamp holder 1409 can be inserted for engagement with the clips 1407. The flanges 1405 of the body 1401 are attached to the housing 1422 by bolts or studs (not shown). Energy for the primary winding 1404 comes from HF transformer 1434 connected to mains supply and having an output wire loop 1432 that can be wound onto the half-core 1403 to provide the primary winding. It will be appreciated that an incandescent lamp, e.g. a low-voltage dichroic lamp may be used in place of the LED.

An installation for a fluorescent lamp working at mains voltage is shown at Figure 15. Tubes 1500 depend from a body 1502 housing the ballast and starting circuitry shown in Figure 6a on a small circuit board and having a secondary winding around a load half-core 1504 which appears at a top face of the body 1502. A ceiling rose 1506 has depending walls 1508 between which the body 1502 is a sliding fit, and latch tongues 1510 also depending from the rose 1506 slide over recessed surfaces 1512 of the body and snap engage locking surfaces 1514 to hold the body 1502 positively into the rose 1506. A second half-core 1516 around which is wound primary winding loop 1518 is a sliding fit between upstanding walls 1520, 1522 and is retained in position by snap engagement of clips 1524. Again the use of resilient clips enables the half-cores 1504, 1516 to be urged positively together in face-to-face contact. In Figures 16a, 16b, there is shown a power supply unit 1602 fed with mains voltage via a supply cable 1600 and having a circuit e.g. as shown in Figure 16b. From the underside of the unit 1602 there appear pole pieces of a half core 1616 arranged to clip into the socket defined by walls 1520, 1522 of the rose 1506. Latching surfaces on the pole pieces 1616 enable the power unit to be clipped into the socket in either the vertical attitude of Figure 16a or the horizontal attitude of Figure 16b.

Claims

1. A two-part induction coupling apparatus for supplying energy to a load, in use the two-part induction coupling including a first part comprising a first core portion and a primary winding, the primary winding being connected to a high frequency power supply and a second part comprising a second core portion and a secondary winding, the secondary winding being connected for delivering energy to a load, the core portions being of a high resistivity material, in which at least one of the first and second core portions has a preformed profile to accept a user wound winding, the preformed profile ensuring a correct number of windings are applied.
- 5 2. Apparatus according to claim 1 wherein the first and second core portions of the induction connector are adapted to mate and be disengaged one from another.
- 10 3. Apparatus according to claim 1 or 2, wherein the high frequency power supply has a frequency of 23 kHz-10 MHz.
4. Apparatus according to claim 1 or 2, wherein the high frequency power supply has a frequency of 25-60 kHz.
- 15 5. Apparatus according to claim 1 or 2, wherein the high frequency power supply has a frequency of 30-50 kHz.

6. Apparatus according to any one of the preceding claims, further comprising over-current and/or load short circuit protection.
7. Apparatus according to any one of the preceding claims, wherein the first and second core portions are of a material having a bulk resistivity of at least $10^3 \Omega \cdot \text{cm}$.
- 5 8. Apparatus according to claim 7, wherein the first and second core portions are of a material having a bulk resistivity of at least $10^4 \Omega \cdot \text{cm}$.
9. Apparatus according to any preceding claim, wherein the first and second core portions are of a nickel-zinc ferrite.
- 10 10. Apparatus according to any one of the preceding claims, including pins and sockets that removably push together for mating together the first and second parts of the coupling.

11. Apparatus according to any one of claims 1 to 9, including clips and recesses that removably snap together for mating the first and second parts of the coupling.
12. Apparatus according to any of claims 1 to 9, including bayonet formations and recesses that removably twist together for mating the first and second parts of the coupling.
- 5 13. Apparatus according to any one of the preceding claims, wherein the load comprises one or more of the following group comprising: mains incandescent lamps, low-voltage incandescent lamps, light-emitting diodes and fluorescent lamps.
14. Apparatus according to claim 13, wherein the load comprises a plurality of lamps in parallel.
- 10 15. Apparatus according to any of claim 13, wherein the load comprises a plurality of lamps in series.
16. Apparatus according to any claim 13, wherein the load comprises a plurality of lamps on a wire or track.
- 15 17. Apparatus according to any of claims 1 to 12, wherein the load comprises an electric motor, a power supply for a computer, radio, television or like electronic device, a heater or the like.

18. Apparatus according to any one of the preceding claims, having a primary connection with a multi faceted primary induction connector adapted to couple energy to one or more secondary connectors.
19. Apparatus according to any one of claims 1 to 17, wherein the secondary connection has a multi faceted secondary induction connector adapted to couple energy from one or more primary connectors.
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20. Apparatus according to any one of the preceding claims capable of providing a voltage in dependence upon the number of windings on the secondary core.
21. Apparatus according to any one of the preceding claims wherein the output voltage from the secondary winding is either AC or DC.
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22. Apparatus according to any one of the preceding claims, wherein the connectors can be rotated with respect one to another thereby varying the amount of energy coupled from the primary core portion to the secondary core portion.
23. Apparatus according to claim 22, when dependent upon any of claims 13 to 16, wherein the core portions can be rotated with respect one to another thereby providing a dimmer switch.
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24. A two-part induction connector according to claim 22, when dependent upon any of claims 13 to 16, wherein a switching or dimming effect is achieved by increasing the air gap between surfaces of primary core and secondary core portions.

25. Apparatus according to any one of the preceding claims, in which the first and 5 second parts are formed in any shape from the group comprising: a toroid, rhomboid, cube, parallelepiped, hemisphere, frusto-conical or other circular symmetric solid.

26. Apparatus for supplying energy to a load, comprising: a power supply unit having an input for receiving current at mains frequency, means for increasing said frequency to a higher frequency, an output for delivering energy at the higher 10 frequency; And a two part induction connector having a first core portion that has a primary winding connection connected to the output of the power supply unit and a second core portion that has a secondary winding connection for delivering energy to a load, the core portions being of a high resistivity material.

27. A two-part induction connector, or a primary or secondary portion thereof, for 15 use in the apparatus of claim 26.

28. A lamp having formed in its housing a secondary core of a two-part induction connector and being in electrical connection with a winding on said core in order to energise the lamp.

29. An appliance including the load of claim 26, wherein the appliance is taken from the group of, computers, computer peripheral devices, telecommunications equipment including handheld devices, office equipment, medical equipment, domestic electrical appliances such as dish washers, washing machines, micro-wave 20 ovens (white goods), food mixers, radios, televisions, hi-fi equipment, audio equipment (brown goods), mining equipment, industrial equipment, aerospace equipment, marine and sub-marine equipment, automotive equipment, commercial and domestic furniture, school equipment, retail point of sale and advertising equipment, road signs, road markings, street furniture, petrochemical equipment, 25 lighting: including commercial, industrial, retail, transport airfield and runway, road 30 lighting: including commercial, industrial, retail, transport airfield and runway, road

signs, road markings, electronic surveillance equipment, printed circuit boards, military equipment, transport equipment and security systems.

30. The apparatus of claim 26, adapted for use with renewable electricity generators including: wind, solar, wave, and hydroelectric generators.

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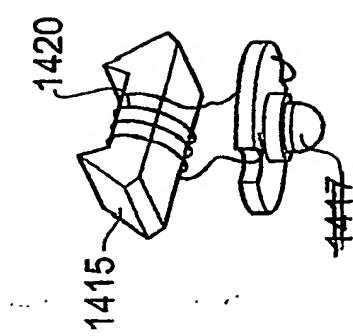


Fig. 14d

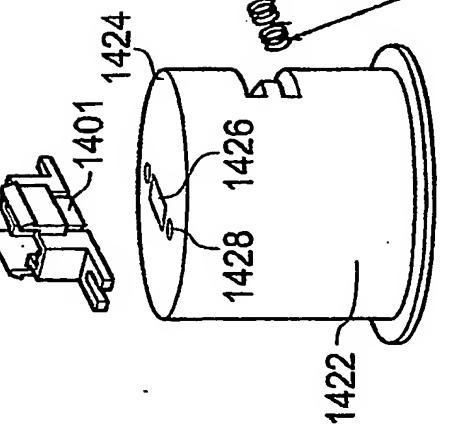
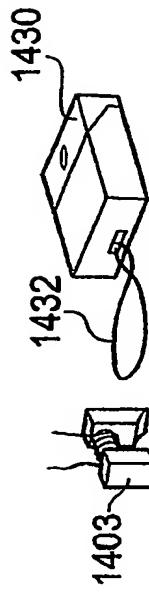


Fig. 14e

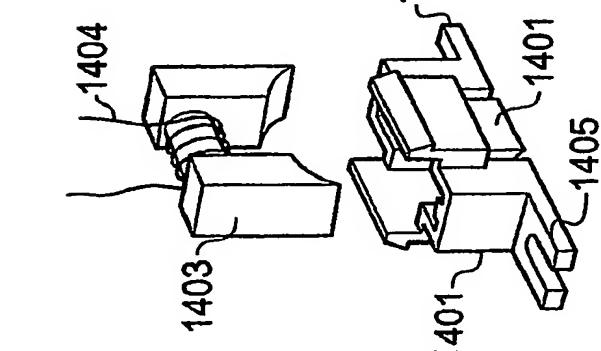


Fig. 14b

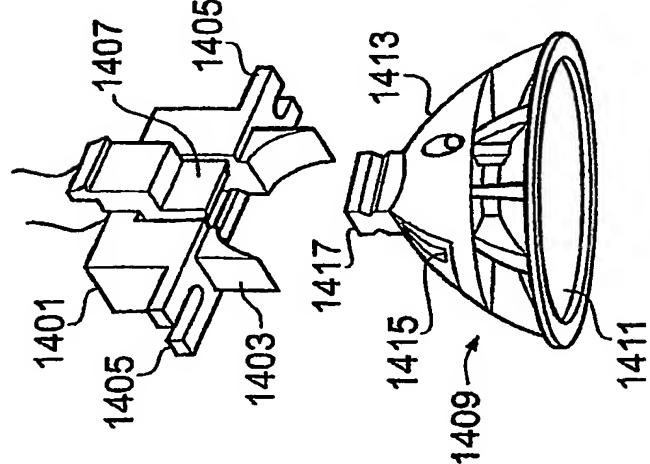


Fig. 14a

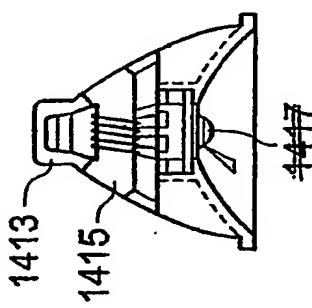


Fig. 14c